

NASA TECH BRIEF

Manned Spacecraft Center

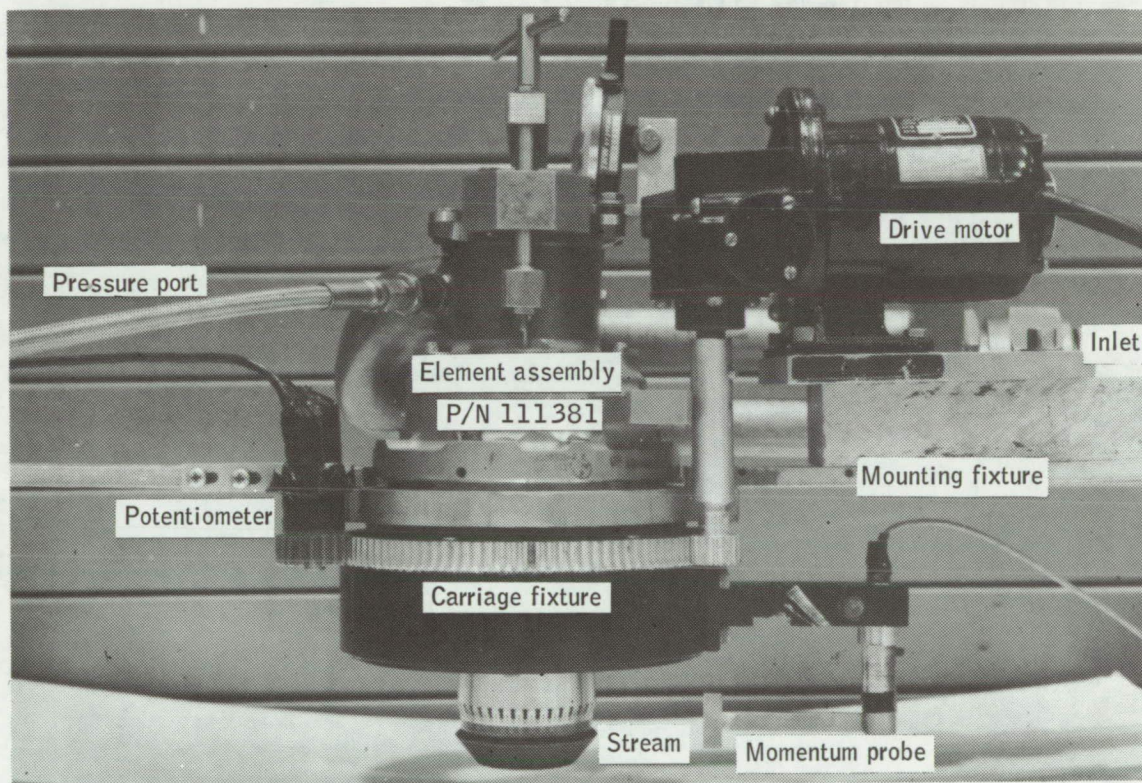


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Spray Momentum Measuring System

A new technique for measuring the momentum of fluid ejected from an orifice enables accurate prediction of the erosion and cavitation produced by

Using a standard water flow bench, a strain-gage force-measuring cell is combined with a momentum probe and a rotating carriage. From the graphical



a fluid spray. The technique is especially useful for measuring high velocity sprays produced by small orifices. Although originally designed to determine oxidizer-injection patterns of liquid fueled rocket engines, the technique may be used with many other liquids, or, with appropriate modification, with gases.

data produced, a circumferential momentum profile of a spray mechanism can be derived. Localized erosion characteristics are directly proportional to the spray momentum revealed by the profile. With probes properly selected, depending on the stream velocity and the sensitivity desired, measurements may

(continued overleaf)

be made at distances between 1 mm and 15 cm from the edge of the slot, for orifices as small as 0.38 by 2.5 mm.

The spray mechanism (in this case, the injector element of the Lunar Module descent engine) is mounted on the water flow bench. Water flows through the system at the desired rate and pressure while the momentum probe is driven at a constant speed around the circumference of the element. Semiconductor strain gages inside the probe measure the force of the intercepted spray from each orifice. The tip of the probe, upon which the injected spray impinges, may be varied to match the size and shape of any fluid stream.

Notes:

1. This technique can be used to measure nozzle and injector performance with respect to stream concentricity, injection uniformity, and erosion. It may be applied to designing or calibrating injectors for combustion chambers, turbines, coating devices, or similar apparatus in which precise knowledge of stream momentum is essential.

2. Requests for further information may be directed to:

Technology Utilization Officer
Manned Spacecraft Center, Code JM7
Houston, Texas 77058
Reference: TSP71-10137

Patent status:

No patent action is contemplated by NASA.

Source: Ellis W. Sheffield of
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